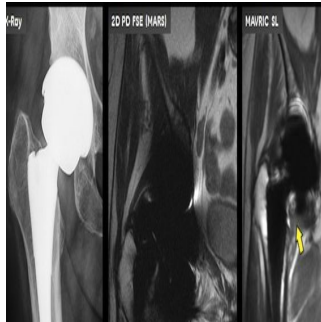

MR Challenges in Imaging Joint Replacements and Devices



The clinical need to more accurately image soft tissue and bone in patients with joint replacements and other implanted devices is expected to grow. Each year 2.9 million joint replacements take place worldwide with 1 million Americans receiving a hip or knee replacement. In the U.S., by 2030, the annual demand for primary total hip arthroplasties will grow to 572,000. Knee arthroplastic procedures are expected to rise to 3.48 million.

Complications include infection, dislocation, blood clots, and nerve and blood vessel injury. Patients may also present with pain and/or a change in the way they walk or run. This can be due to inflammation of the joint lining (synovitis) in patients with metal-on-metal hip implants. This may occur long before symptoms appear. MR imaging is able to detect inflammation in both symptomatic and asymptomatic patients, helping to identify those patients who need revision surgery before tissue sustains further damage that makes a revision more difficult.

MR has long been considered the most effective technique in which to assess soft tissue response and bone loss around metallic implants. However, the "magnetic" in MRI means that doctors can only use MRI to image implants made from carefully selected alloys. However, the paramagnetic metal used in joint replacements and implanted devices can cause magnetic field distortion and signal void producing images that are of non-diagnostic quality.

An innovative technology, MAVRIC SL by GE Healthcare in partnership with Hospital for Special Surgery, is able to address this major gap in patient care and minimise image distortion in the areas near MR conditional metal implants by using a technique to collect multiple snapshots taken at different frequencies. These individual snapshots are then combined to form the final image. A deblurring post-processing technique is then implemented to optimize the volume combination process.

This technique is expected to significantly impact patient care providing valuable clinical information for an issue that can have significant human and economic costs, particularly when diagnosis is delayed. Physicians are able to use these images as visual aids in explaining to patients why they are in pain. Patients will also benefit from this non-invasive procedure that allows treatment decisions to be made in less time and may also reduce the need for exploratory surgery.

MAVRIC SL aims to optimize the patient experience by innovating to ensure the highest standards in care and safety for patients. It also aims to improve diagnosis accuracy by delivering superb image quality and by working alongside healthcare professionals new ways are discovered to drive better outcomes and comfortable experiences.

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